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DATA SHEET

BF991
N-channel dual-gate MOS-FET

Product specification
File under Discrete Semiconductors, SC07

April 1991

Philips
Semiconductors

PHILIPS

N-channel dual-gate MOS-FET BF991

FEATURES

- Protected against excessive input voltage surges by integrated back-to-back diodes between gates and source.

DESCRIPTION

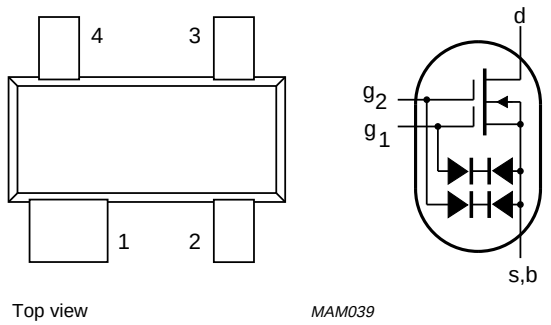
Depletion type field-effect transistor in a plastic SOT143 microminiature package with interconnected source and substrate.

APPLICATIONS

- VHF applications such as:
  - VHF television tuners and FM tuners
  - Professional communication equipment.

PINNING

PIN	SYMBOL	DESCRIPTION
1	s, b	source
2	d	drain
3	g_2	gate 2
4	g_1	gate 1



Marking code: M91.

Fig.1 Simplified outline (SOT143) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{DS}	drain-source voltage		–	20	V
I_D	drain current		–	20	mA
P_{tot}	total power dissipation	up to T_{amb} = 60 °C	–	200	mW
T_j	junction temperature		–	150	°C
$\lvert Y_{fs} \rvert$	transfer admittance	f = 1 kHz; I_D = 10 mA; V_{DS} = 10 V; $V_{G2\text{-}S}$ = 4 V	14	–	mS
$C_{ig1\text{-}s}$	input capacitance at gate 1	f = 1 MHz; I_D = 10 mA; V_{DS} = 10 V; $V_{G2\text{-}S}$ = 4 V	2.1	–	pF
C_{rs}	feedback capacitance	f = 1 MHz; I_D = 10 mA; V_{DS} = 10 V; $V_{G2\text{-}S}$ = 4 V	20	–	fF
F	noise figure	f = 200 MHz; G_S = 2 mS; $B_S = B_{Sopt}$; I_D = 10 mA; V_{DS} = 10 V; $V_{G2\text{-}S}$ = 4 V	1	2	dB

LIMITING VALUES

In according with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	20	V
I_D	drain current (DC)		–	20	mA
$I_{D(AV)}$	average drain current		–	20	mA
I_{G1-S}	gate 1-source current		–	±10	mA
I_{G2-S}	gate 2-source current		–	±10	mA
P_{tot}	total power dissipation	up to T_{amb} = 60 °C; note 1	–	200	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air; note 1	460	K/W

Note to the Limiting values and the Thermal characteristics

1. Device mounted on a ceramic substrate of $8 \times 10 \times 0.7$ mm.

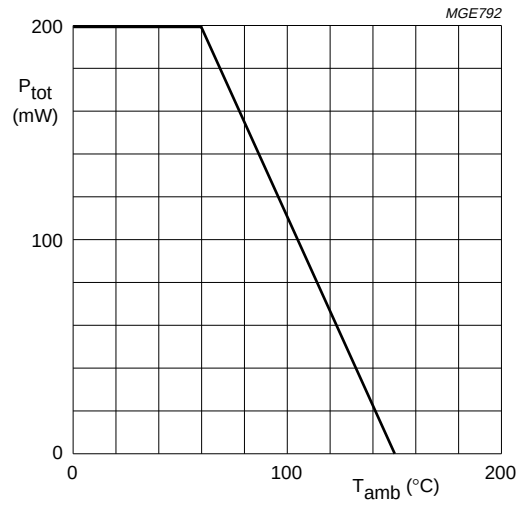


Fig.2 Power derating curve.

STATIC CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{G1-SS}	gate 1 cut-off current	V_{G1-S} = 5 V; V_{G2-S} = V_{DS} = 0	–	50	nA
I_{G2-SS}	gate 2 cut-off current	V_{G2-S} = 5 V; V_{G1-S} = V_{DS} = 0	–	50	nA
I_{DSS}	drain current	V_{DS} = 10 V; V_{G1-S} = 0; V_{G2-S} = 4 V	4	25	mA
$V_{(BR)G1-SS}$	gate 1-source breakdown voltage	I_{G1-SS} = 10 mA; V_{G2-S} = V_{DS} = 0	6	20	V
$V_{(BR)G2-SS}$	gate 2-source breakdown voltage	I_{G2-SS} = 10 mA; V_{G1-S} = V_{DS} = 0	6	20	V
$V_{(P)G1-S}$	gate 1-source cut-off voltage	I_D = 20 μA; V_{DS} = 10 V; V_{G2-S} = 4 V	–	–2.5	V
$V_{(P)G2-S}$	gate 2-source cut-off voltage	I_D = 20 μA; V_{DS} = 10 V; V_{G1-S} = 0	–	–2.5	V

DYNAMIC CHARACTERISTICS

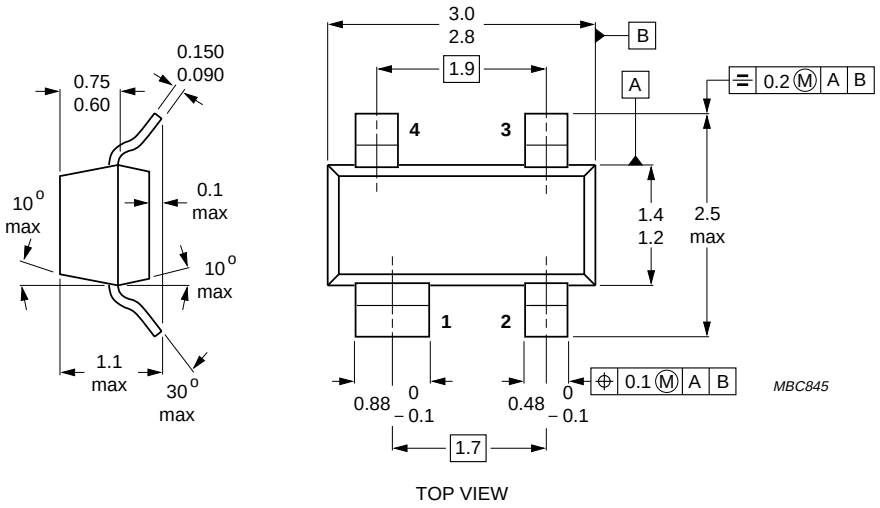
Measuring conditions (common source): I_D = 10 mA; V_{DS} = 10 V; V_{G2-S} = 4 V; T_{amb} = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$\lvert Y_{fs} \rvert$	transfer admittance	f = 1 kHz	10	14	–	mS
C_{ig1-s}	input capacitance at gate 1	f = 1 MHz	–	2.1	–	pF
C_{ig2-s}	input capacitance at gate 2	f = 1 MHz	–	1	–	pF
C_{rs}	feedback capacitance	f = 1 MHz	–	20	–	fF
C_{os}	output capacitance	f = 1 MHz	–	1.1	–	pF
F	noise figure	f = 100 MHz; G_S = 1 mS; B_S = B_{Sopt}	–	0.7	1.7	dB
		f = 200 MHz; G_S = 2 mS; B_S = B_{Sopt}	–	1	2	dB
G_{tr}	transducer gain; note 1	f = 100 MHz; G_S = 1 mS; B_S = B_{Sopt}; G_L = 0.5 mS; B_L = B_{Lopt}	–	29	–	dB
		f = 200 MHz; G_S = 2 mS; B_S = B_{Sopt}; G_L = 0.5 mS; B_L = B_{Lopt}	–	26	–	dB

Note

1. Crystal mounted in a SOT103 package.

PACKAGE OUTLINE



Dimensions in mm.

See also *Soldering recommendations.*

Fig.3 SOT143.

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

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